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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
VAN ROY, TOD THOMAS	

ART UNIT	PAPER NUMBER
2828	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/726,141	PARK ET AL.	
	Examiner	Art Unit	
	TOD T. VAN ROY	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The examiner acknowledges the amending of claim 1 and the cancellation of claim 15.

Allowable Subject Matter

The indicated allowability of claims 7-8 is withdrawn in view of the newly discovered reference(s)/passages to Sartorius. Rejections based on the newly cited reference(s)/passages follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-8, and 11, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sartorius et al. ("Dispersive Self Q-Switching in Self-Pulsating DFB Lasers", IEEE JQE, vol.33 No.2, February 1997, pgs.211-217) in view of Huang (US 6018541).

With respect to claims 1 and 5, Sartorius teaches a self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency (abs.), comprising: a DFB laser section (fig.1 laser section) that includes a grating (fig.1 in cut-away view) and an active structure (fig.1 InGaAsP) for emitting laser light in a longitudinally single mode (pg.212 col.1 para.2), wherein the intensity of oscillating laser light is controlled by means of the current injected to the DFB laser section (through electrode on top of the laser section, via control of gain); and an external cavity including a phase control section (fig.1 phase tuning section) and an amplifier section (fig.1 reflector section, amplifies with increasing current to the active layer, fig.2) for controlling the phase and strength of he laser light fed back to the DFB laser section after round-trip through the phase control section and the amplifier section by means of the currents injected into the phase control section and the amplifier section (pg.212 col.1 para.2, fig.2), the phase control section having a guiding layer as a passive waveguide (fig.1 InGaAsP) that controls a phase variation of feedback laser light (pg.212 col.1 para.2), the amplifier section having an active structure (fig.1 InGaAsP, extends through the laser and reflector sections) that controls the strength of the feedback laser light (fig.2), the DFB section and the external cavity being monolithically integrated on a single substrate, current being independently injected into each of the sections (via separate contacts), wherein the multi-section

semiconductor diode laser outputs high frequency optical pulsation according to self mode-locking of compound cavity modes (abs, via control of phase). Sartorius does not teach the DFB laser section to be complex coupled or the bandgaps of the two waveguides to be equal. Huang teaches a DFB laser waveguide wherein the grating is gain-complex coupled (col.3 lines 25-35, inherently varying the effective refractive index and gain). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Sartorius with the grating structure of Huang in order to align the peaks of the grating with the peaks of the standing wave in the device and in effect amplify the optical energy of the standing wave (Huang, col.3 lines 45-46), while maintaining the feedback functionality of the grating. Additionally, it would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the 1.18um bandgap waveguide of Sartorius to the same value as the 1.3um bandgap waveguide in order to adjust the refractive index value to couple more light to the diffraction grating, allowing for higher reflection values and more control over the feedback light from the reflector section.

References noted, but not relied upon, are US 5602866 and 5177758. Each of these references teaches (in figures 6 and 10A respectively) the use of equal bandgap waveguides in similar integrated DFB structures to control the location of the guided wave relative to the grating.

With respect to claim 2, Sartorius further teaches the laser diode can be a buried heterostructure (fig.1).

With respect to claim 3, Sartorius further teaches the laser diode has a ridge structure (fig.2).

With respect to claim 4, Huang further teaches the use of a loss coupled grating constructed in a manner which a diffraction grating is formed in an additional absorptive layer (col.3 lines 25-32), which longitudinally periodically varies both effective refractive index and loss (inherent function of the loss grating). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Sartorius and Huang with the loss coupled grating of Huang in order to reduce levels of light reflected back into the device structure (Huang, col.3 lines 55-60).

With respect to claim 6, Sartorius further teaches the incorporation of a first light guide layer, an active layer, and a second light guiding layer in the DFB and amplifier sections (fig.1 n-InGaAsP, InGaAsP, p-InGaAsP).

With respect to claims 7-8, Sartorius further teaches the guiding layers to be of InGaAsP and have a bandgap of 1.3um (fig.1, claim 1 rejection) and the active region to be InGaAsP of 1.55um (fig.1), but does not teach the thickness to be 70nm or the use of barrier layers. It would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the layers of Sartorius to a desired thickness as a matter of optimization of a known element (see MPEP 2144.05 II A), as well as to utilize barrier layers in the InGaAsP active region as a means to confine carriers to improve efficiency as is well known and widely practiced in the art.

With respect to claim 11, Sartorius further teaches the DFB laser section, the phase control section and the amplifier section are constructed through evanescent

coupling in which the sections have a common guide layer (sections coupled through common guide layer fig.2 n-InGaAsP).

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sartorius and Huang in view of Oka et al. (US 5177758).

With respect to claim 9, Sartorius teaches the guiding layer of the phase control section to be arranged through butt-coupling, but does not teach its central axis to accord with those of the active structures. Oka teaches a grated laser structure incorporated monolithically with a phase control and amplifier section, wherein the central axis of the guiding layer of the phase control section aligns with the active sections (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Sartorius and Huang with the guiding layer alignment of Oka in order to maximize the amount of light coupled from one region to the next through the device.

With respect to claim 10, Sartorius further teaches the guiding layers to be of InGaAsP and have a bandgap of 1.3um (fig.1, claim 1 rejection) and the active region to be InGaAsP of 1.55um (fig.1), but does not teach the thickness to be of 400nm. It would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the layers of Sartorius to a desired thickness as a matter of optimization of a known element (see MPEP 2144.05 II A).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sartorius and Huang in view of Hiroki et al. (US 5841799).

With respect to claim 12, Sartorius and Huang teach the device of claim 1, but do not teach the phase control section to be located between the DFB and amplifying sections. Hiroki teaches the phase control section to be located between the DFB and the amplifier sections (fig.7). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Sartorius and Huang with the device organization of Hiroki as a matter of engineering design choice, and further could be considered a rearrangement of parts, which has been held to be of routine skill in the art (In re Japikse, 86 USPQ 70).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sartorius and Huang in view of Kuindersma et al. (US 4995048).

With respect to claim 13, Sartorius and Huang teach the DFB laser device as outlined in the rejection to claim 1, but do not teach the amplifier section to be located between the DFB and the phase control sections. Kuindersma teaches a grated laser structure incorporated monolithically with a phase control and amplifier section, wherein the amplifier section is located between the grating and phase sections (col.2 lines 50-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Sartorius and Huang with the device organization of Kuindersma as a matter of engineering design choice, and further could

be considered a rearrangement of parts, which has been held to be of routine skill in the art (In re Japikse, 86 USPQ 70).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sartorius and Huang in view of Nitta et al. (US 6031860).

With respect to claim 14, Sartorius and Huang teach the DFB laser device as outlined in the rejection to claim 1, including the use of AR coatings, but do not teach the use of an HR coating. Nitta teaches a three-section DFB, phase, and amplifier device wherein AR and HR coatings are used (col.9 lines 5-7). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Sartorius and Huang with the coatings of Nitta in order to designate one side of the device for outputting radiation for use in a communication system, reducing loss from the opposite facet.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TOD T. VAN ROY whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828